BRITISH NUCLEAR ENERGY SOCIETY CONFERENCE ON HEALTH EFFECTS OF LOW DOSE IONISING RADIATION - RECENT ADVANCES AND THEIR IMPLICATIONS

11 - 14 MAY 1987

at

The Royal Institute of British Architects
66 Portland Place
London W1N 4AD

PROGRAMME AND REGISTRATION FORM

British Nuclear Energy Society
1-7 Great George Street
London SW1P 3AA

Co-sponsored by
EUROPEAN NUCLEAR SOCIETY

500-1530 *TEA*

530 - PAPER 14 Studies of mortality among populations of nuclear industry workers
Dr S.A. Fry, Director, Center for Epidemiological Research, Oak Ridge Associated Universities, USA, et al

600 - PAPER 15 The Hanford Study: issues in analysing and interpreting data from occupational studies
Dr E.S. Gilbert, Staff Scientist, Statistics Section, Pacific Northwest Laboratories, USA

630 End of Session

VEDNESDAY 13 MAY 1987

ESSION V - OCCUPATIONAL EPIDEMIOLOGY (B)

900 - PAPER 16 The objectives and results of the AECB research programme on the health effects of ionising radiation
Dr V. Elaguppillai, Atomic Energy Control Board, Canada

930 - PAPER 17 Problems in comparing the findings from studies of radiation workers with risk estimates of the International Commission on Radiological Protection
Dr V. Beral, Senior Lecturer, H. Inskip, L. Carpenter, P. Fraser and M. Booth, London School of Hygiene & Tropical Medicine, UK.

1000 - PAPER 18 Mortality of workers in the nuclear industry - what is an appropriate comparison group?
Dr V. Beral, Senior Lecturer, L. Carpenter, P. Fraser, M. Booth and A. Brown, London School of Hygiene & Tropical Medicine, UK

1030-1100 *COFFEE*

1100 - PAPER 19 Computer assistance in the collection, validation and treatment of data for epidemiological studies
L. Salmon, J.B. Venn, Environmental & Medical Science Division, AERE Harwell and P. Fraser, London School of Hygiene & Tropical Medicine, UK

1130 - PAPER 20 Problems in reaching an overview
Sir Richard Doll, Honorary Consultant, and Dr S.C. Da
Cancer Epidemiology & Clinical Trials Unit, ICRF, Universit
Oxford, UK

1215-1400 *LUNCH*

SESSION VI - GENERAL POPULATION EPIDEMIOLOGY

1400 - PAPER 21 Effects of background radiation
Professor E.G. Knox, The Medical School, University
Birmingham, UK

1430 - PAPER 22 A re-examination of the epidemiological data for the Cumbr
coastal areas
Dr D. Wilkie and R. Hargreaves, UKAEA Windscale Nucl
Laboratories and R. Wakeford, British Nuclear Fuels plc,

1500 - PAPER 23 Epidemiological study of mortality in Palomares
Dr P.M. Pinilla, Facultad de Medicina de Murcia, Spain

1530 - 1600 *TEA*

1600 - PAPER 24 Leukemia mortality and morbidity in Bavaria
B. Grosche, G. Hinz and C. Tsavachidis, Institute of Radiati
Hygiene, West Germany

1630 - PAPER 25 A critical review of statistical evaluations of the clustering of r
diseases, with particular application to the frequency of canc
around nuclear sites in Great Britain
M.R. Croasdale, Senior Engineer, Health & Safety Departme
Central Electricity Generating Board, UK

1700 - PAPER 26 Recent work on local leukemia incidence
Dr P. Cook-Mozaffari, Medical Research Council, University
Oxford, UK

1730 End of session

Epidemiological study of mortality in Palomares

P.M.Pinilla and P.M.Campos
Facultad de Medicina de Murcia, Spain

SYNOPSIS. Since the 17 of january 1966, the inhabitants of Palomares have been exposed to radiation doses of plutonium-239 caused by the nuclear accident which happened on that date , when 2 united states americanos force planes collided. (1)

1. This presented grave problems during the space of time since the accident which included our attempts in the use of claryfying agents, according to the requirements of scientific methods, to determine the possible consequences within the evolution of mortality through biological, radiation effects and analisis of the number of defunctions and their causes.

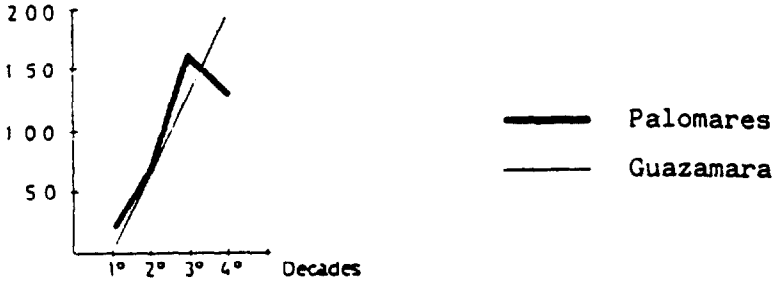
2. This is why we have analised the data of defunction for a period of 40 years divided into two shorter ones of 20 years in each one (before and after the falling of the bombs) : 1946 until 1965, and 1966 until 1985.

Identical data have been gathered and analised from a neighbouring village (Guazamara); miles away, in order to have a control causes of death were re-grouped into eleven different groups for operative criterions. (2)

TABLE 1. Mortality rate caused by heart and respiratory diseases, and by tumors.

		1946-1955	1956-1965	1966-1975	1976-1985
PALOMARES	-heart d.	21,1	198,8	536,5	489,4
	-respiratory d.	21,1	369,3	163,9	52,9
	-tumors	21,1	71,0	163,9	145,5
GUAZAMARA	-heart d.	40,9	298,0	648,5	398,1
	-respiratory d.	20,4	149,0	146,6	46,8
	-tumors	10,2	74,5	134,4	199,0

Graphic 1. Mortality rates by decades for tumors deseases



3. We were able to verify a similar evolution for the principal causes of death heart and respiratory diseases

a/ Heart d. These illneses were the major causes of death we were able to register. The rate of this group of illnesses suffered a very similar evolution in both populations : increasing from the first to the second (decade) and from there to the third, ano gradually dimiwishing in buth areas in the fourth.

b/ Respiratory d. They came second in de number of deaths, the rate took a paralel evolution in both areas : increasing from the first to the second decade, decreasing from the second to the third and continuing to descend the fourth.

c/ Tumors. Between both population areas 63 tumors deaths were registered, against 596 non-tumors (29 in Palomares and 34 in Guazamara).

The rate for this group of diseases chanced in a very different form in the two areas. There was an uninterrupted increase, in Guazamara, from the first decade to the fourth, but, in Palomares, this happened only from the first to the third decade but then decreased to the fourth. (Ref :Table 1)

4. This varying evolution, in our opinion, is not a trustable one as the relevant doctors concerned with the issue of death certificates in Palomares were under great social pressure, inevitably in relation to the nuclear bombs,radiation and possible cancer causes, therefore, must have been given as causes of death incorrect reasons at that particular time.

REFERENCIES

1. Junta de Energía Nuclear (1985). Report to the congress of deputies, Madrid.
2. O.M.S. O.P.S. (1978). International classification of illnesses.

MORTALITY DEVELOPMENT BEFORE AND AFTER THE NUCLEAR ACCIDENT OF 1966 IN PALOMARES

On January 17, 1966, an airplane accident occurred over the skies of Palomares. Two american airplanes collided, a B-52 which carried four thermonuclear bombs of plutonium-239 and its escort, a KC-135, which resulted in a rain of burning wastes, burned pilots and four bombs over Palomares: three on land and one at sea. Each bomb was at least seventy five times more potent than the one used in Hiroshima. Due to the impact of the crash, two of the three bombs that fell on land ruptured their casing and part of its TNT cargo exploded releasing its plutonium-239 in an aerosol form and consequently contaminated the area.

Despite public health consequences of this accident there has not been any epidemiologic study on the population of Palomares. Only one report by CAPS has summarized the JEN and CSN documents sent to Congress in 1985.

There have been great discussions over the last years about the health consequences on the population of Palomares. It is our intention to clarify this situation following the scientific method. Our objectives are as follows: 1) determine the possible consequences in the development of mortality attributable to biological effects of radiation; and 2) present a detailed analysis of causes and quantitation of deaths in the exposed population since 1966. For this purpose, we have established three working hypotheses.

Biological Hypothesis - Due to the long latent periods necessary for the appearance of tumors caused by radiation (5), twenty years is not enough time to observe the appearance of the expected radiation-induced tumors in the population of Palomares.

Sanitary Hypothesis - There has been an enhanced awareness in the exposed population as well as in the sanitary structure, directed towards the detection of tumors in general, due to the possibility of their relation to the radiation.

Sociologic Hypothesis - There has been an underestimate of deaths reporting due to cancer by physicians because of the existing social pressures in Palomares.

Materials and Methods

We have collected the death-rate data of Palomares and Guazamara (population selected as control) for a period of forty years, each divided in two stages, before (1946-1965) and after (1966-1985) the accident.

A total of 659 deaths were analyzed on the basis of sex, year and date of death, social status and the three existing causes of death: that of the Book of Civil Record, and the immediate and fundamental from the medical death certificate.

The birthing data were obtained from the baptismal certificates from the files of the corresponding churches (since the data from baptismal records was more reliable than the data gathered from the Civil Record) and the population data from the records of the province of Almeria corresponding to the years 1950, 1960, 1970 and 1981. The distance in kilometers between the studied populations was measured with a straight line over a map from the Almeria Provincial Deputy of October 1985.

We utilized the statistical programs BMDP2a and BMDP 4F in a HoneyWell Bull-64 from the University of Murcia and used the Pearson X^2 test and residue analysis for the confidence tests. A FORTRAN program was used to convert the initial code of the diagnosis to the OMS International classification, whereby eleven groups of diseases were formed and analyzed.

Development of main mortalities

1) Cardiac disease- With the exception of the undefined cause group, this causal group had the largest number of deaths. The death rates due to heart disease developed very similarly in Palomares and Guazamara; increasing from the first to second decade (from 21.1 to 198.8 and 40.9 to 298.0 respectively) and from the latter to third (from 98.8 to 536.5 and from 298.0 to 648.5) and decreasing from the third to fourth decade (from 536.5 to 489.4 and from 648.5 to 398.1). Please see Table I, Graph I).

2) Respiratory disease- The death rates from respiratory illness developed in similar manner in Palomares and Guazamara; there was an increase from the first to second decade (21.1 to 369.3 and 20.4 to 149.0 respectively), and a decrease from the latter to third decade in both populations (from 369.3 to 163.9 and from 149.0 to 146.6), it continued decreasing until the fourth decade (from 163.9 to 52.9 and from 146.6 to 46.8). See Table I, Graph II.

3) Tumoral disease- A total of 63 deaths due to tumors were registered, (29 in Palomares and 34 in Guazamara) against 596 non-tumoral deaths. The death rates in this group of diseases studied by decades increased without interruption in Guazamara from the first to fourth decade (10.2, 74.5, 134.4, and 199). However, death rates in Palomares increased for the first three decades and decreased during the fourth decade with numbers varying from 21.1, 71.0, 163.9 and 145.5. We don't believe that in Palomares, particularly during these dates (1976-1985), factors justifying a real decrease in tumor mortality rates would occur. On the contrary, we are inclined to believe that it should have increased as it happened in Guazamara and for that matter in the rest of Spain, but due to social pressure of radiation induced cancer, and increased social awareness awakened by democracy, a conscious or unconscious under-reporting of tumor-caused deaths could have been produced. This would explain the above-mentioned decrease in tumor mortality rate in Palomares during the fourth decade. See Table I, Graph III.

Conclusions:

1) With a similar death rates development in both populations, death rates analysis revealed that more people died in Palomares in the period after the accident than before, while in Guazamara the opposite occurred. When the general death rates are studied by decades, they turn out to be approximately equal in both populations for the first and second decade. In the third and fourth decades however, the rates were higher in Palomares than in Guazamara.

With regard to the infant mortality, we were able to determine that it develops in parallel form in birth populations. The average age of death in Palomares was lower than in Guazamara both before and after the bombs fell, and is equal to four and a half years. The birth rates developed in parallel form in both populations while the vital index was always higher in Guazamara than in Palomares.

2) Both cardiac and respiratory illness had a very similar development in both populations.

3) The percentage of tumor-caused deaths during the forth decade studied here was always lower in Palomares (8.8%) than in Guazamara (10.3%). The increase percentage of tumors from the first twenty year period to the second period was lower in Palomares (75.9%) than in Guazamara (82.4%). The tumor-caused death rates and the death rates per decade increased continuously in both populations during the first three decades. However, Guazamara exhibited a further increase in death rates during the fourth period while Palomares exhibited a decrease, values ranged from 134.4 to 199.0 in Guazamara and 163.0 to 145.5 in Palomares. We believe this decrease in the tumor-caused death rates in Palomares in the fourth decade could have been due to an underestimate by physicians due to the social pressures that inevitably established a relation between the bombs, the radiation and tumoral diseases.

4) It would be desirable to continue the present study due to the fact that the necessary latent periods for the appearance of the biological effects of radiation are very long (greater than twenty years). It would be equally desirable to complete and broaden the present study, trying to obtain the nominal census of Palomares in 1966 to do a person by person study, including people who have immigrated to Barcelona, Madrid and Sevilla.